

Department of Computer Engineering

T.E. (Computer Sem VI)

Assignment -2 Artificial Intelligence (CSC604)

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Considering the following objectives :

CSC604.1: To grasp the fundamental concepts and methods involved in creating intelligent systems.

1. CSC604.2: Ability to choose an appropriate problem solving method and knowledge representation technique.
2. CSC604.3: Ability to analyze the strength and weaknesses of AI approaches to knowledge-intensive problem solving.
3. CSC604.4: Ability to design models for reasoning with uncertainty as well as the use of unreliable information.
4. CSC604.5: Ability to design and develop AI applications in real world scenarios.

A) what are the key considerations in designing an expert system that effectively utilizes knowledge representation techniques to handle uncertainty and unreliable information, while ensuring practicality in real-world applications?

B) Additionally, how do these considerations align with the strengths and weaknesses of various AI approaches to knowledge-intensive problem solving?"

-> A) Designing an expert system that effectively utilizes knowledge representation techniques to handle uncertainty and unreliable information, while ensuring practicality in real-world applications, involves several key considerations:

1. Knowledge Representation Techniques: Choose appropriate knowledge representation techniques that can capture uncertainty and handle unreliable information effectively. This might involve using probabilistic models, fuzzy logic, or Bayesian networks to represent uncertain information.
2. Uncertainty Handling Mechanisms: Implement mechanisms within the expert system to handle uncertainty, such as probabilistic reasoning algorithms, fuzzy logic inference, or Dempster-Shafer theory for combining uncertain evidence.

3. **Reliability Assessment:** Develop methods to assess the reliability of information sources and incorporate this assessment into the reasoning process. This could involve weighting information sources based on their reliability or using trust models to evaluate the credibility of sources.
4. **Adaptability and Learning:** Incorporate mechanisms for the expert system to adapt and learn from new data and experiences, especially in dynamic real-world environments where information may change over time. This might involve techniques such as machine learning algorithms or reinforcement learning to update the system's knowledge base.
5. **Integration with Domain Knowledge:** Ensure that the expert system integrates domain-specific knowledge effectively, as this is crucial for making accurate decisions in real-world scenarios. This might involve collaborating closely with domain experts to capture and represent relevant knowledge.
6. **Scalability and Efficiency:** Consider the scalability and efficiency of the expert system, especially when dealing with large amounts of uncertain or unreliable information. Design the system to be computationally efficient while still maintaining accuracy and reliability.

B) These considerations align with the strengths and weaknesses of various AI approaches to knowledge-intensive problem solving as follows:

1. **Strengths of Probabilistic Approaches:** Probabilistic approaches, such as Bayesian networks, excel at representing and reasoning with uncertainty. They provide a principled framework for incorporating uncertain information and updating beliefs based on evidence.
2. **Weaknesses of Probabilistic Approaches:** Probabilistic approaches may struggle with scalability and computational complexity, especially when dealing with large-scale problems or complex probabilistic dependencies.
3. **Strengths of Fuzzy Logic:** Fuzzy logic is adept at handling imprecise and uncertain information by allowing for degrees of truth. It can effectively model linguistic variables and fuzzy rules, making it suitable for domains where precise measurements are difficult to obtain.
4. **Weaknesses of Fuzzy Logic:** Fuzzy logic may struggle with capturing complex relationships and dependencies between variables, especially in domains with highly nonlinear or dynamic behavior.
5. **Strengths of Machine Learning:** Machine learning techniques can adapt and learn from data, making them well-suited for real-world applications where information may be

uncertain or unreliable. They can discover patterns and relationships in data that may not be apparent to human experts.

6. Weaknesses of Machine Learning: Machine learning techniques may require large amounts of high-quality training data to generalize effectively, which may not always be available in real-world scenarios. Additionally, they may lack interpretability, making it difficult to understand the reasoning behind their decisions.

By considering these strengths and weaknesses, designers can choose the most appropriate AI approach and tailor it to effectively address the challenges of handling uncertainty and unreliable information in real-world expert systems.

1. Rubrics for the Second Assignments:

Indicator	Average	Good	Excellent	Marks
Organization (2)	Readable with some missing points and structured (1)	Readable with improved points coverage and structured (1)	Very well written and fully structured	
Level of content(4)	All major topics are covered, the information is accurate (2)	Most major and some minor criteria are included. Information is accurate (3)	All major and minor criteria are covered and are accurate (4)	
Depth and breadth of discussion and representation(4)	Minor points/information maybe missing and representation is minimal (1)	Discussion focused on some points and covers them adequately (2)	Information is presented in depth and is accurate (4)	
Total				

Signature of the Teacher